Iowa State University

Anthropology Department

STABLE ISOTOPE ANALYSIS OF A FLAT-HEADED PECCARY TUSK

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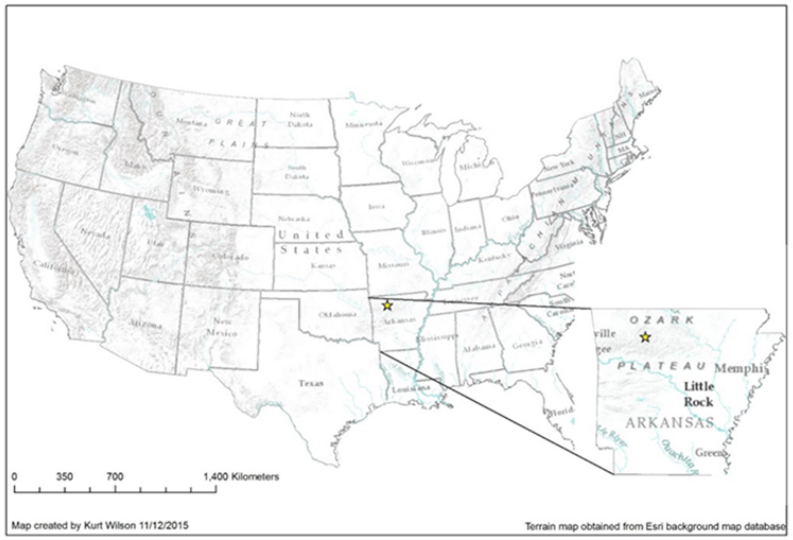
Goals of the Research

- Determine if isotopic analyses were feasible on available specimens
- Identify dietary information about *Platygonus compressus*
- Investigate the possibility of tusks recording seasonal signatures
- Generate a proof of concept to move forward with additional research

Discoveries of the Research

- It is possible to get isotope data from the tusks
- Combined $\delta^{13}C$ of food and water reveals a likely C_3 plant dietary focus
- The $\delta^{13}C$ signature confirms prior dietary assumptions made based on dental wear
- Seasonal $\delta^{18}O$ variations are captured in the tusk

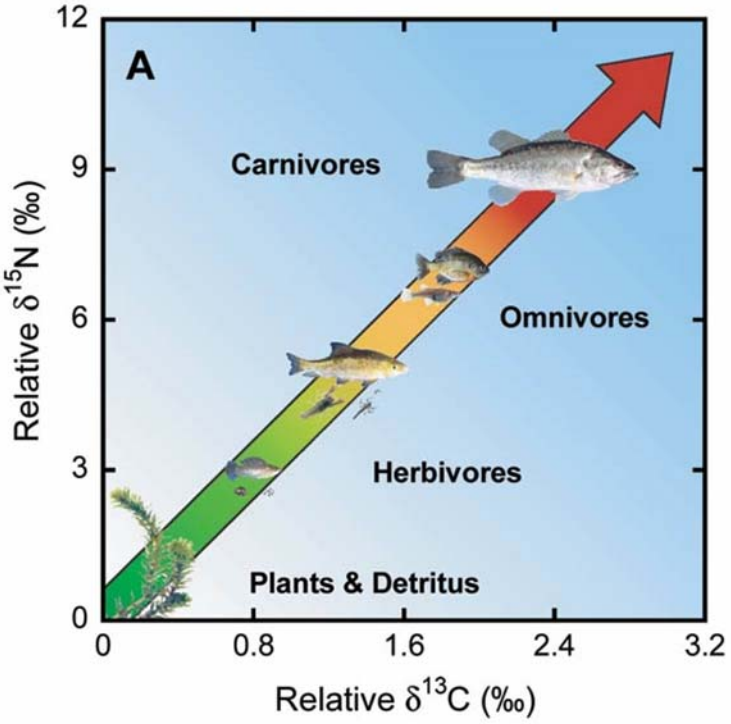
Platygonus compressus and Peccary Cave



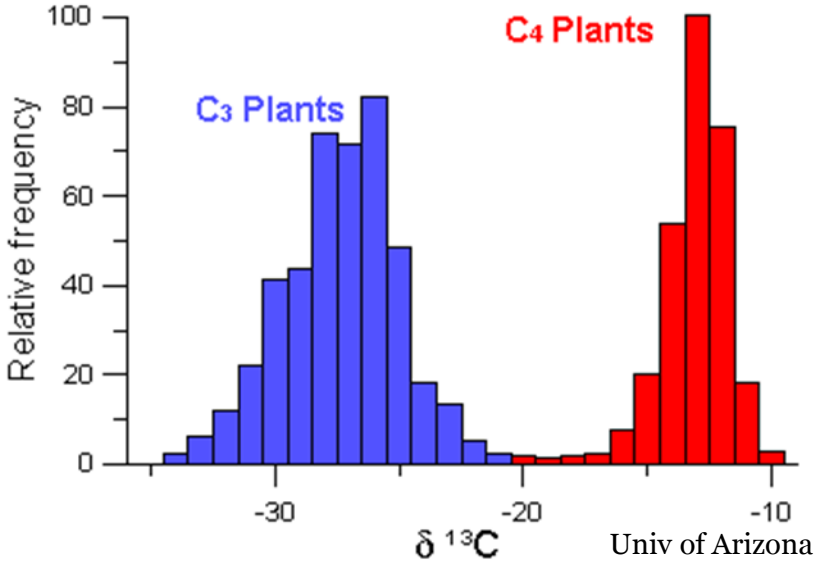
Compressus herd - above
Simpson 1946

Garton 2011

^{13}C Stable Isotopes – you are what you eat (literally)



USGS – SOFIA 2004



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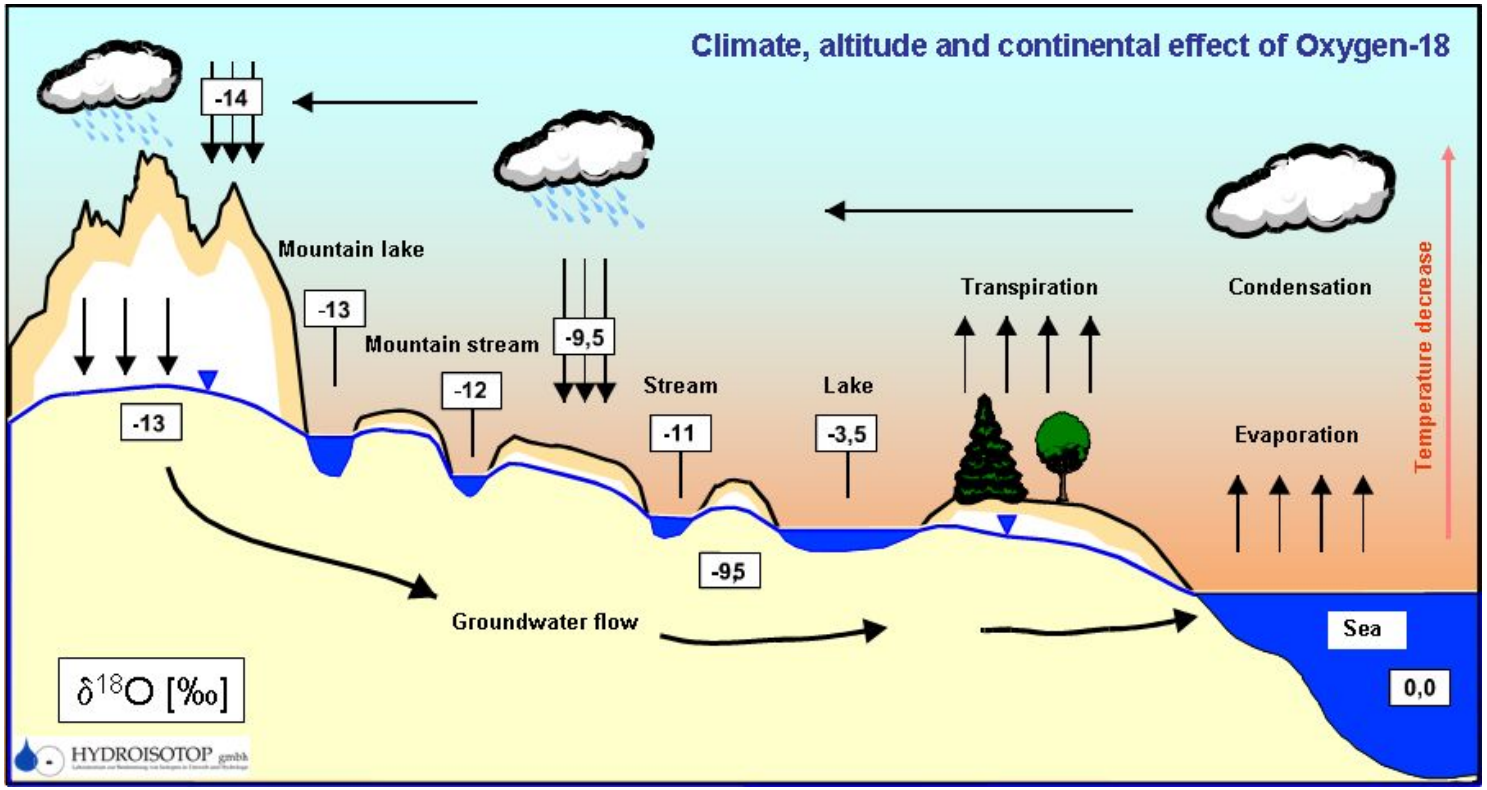
- C_3 = trees, shrubs, acorns, etc. from cool, moist climates – $\delta^{13}C$ -34 - -23‰
- C_4 = grasses (mostly) from warm, dry climates - $\delta^{13}C$ -15 - -12‰
- $\delta^{13}C$ = ratio of heavy (13) to light (12) carbon

$\delta^{18}O$

$\delta^{18}O$ gets lower in ‰ values as distance from source increases, temperature decreases, and/or as great amounts of precipitation occur at once



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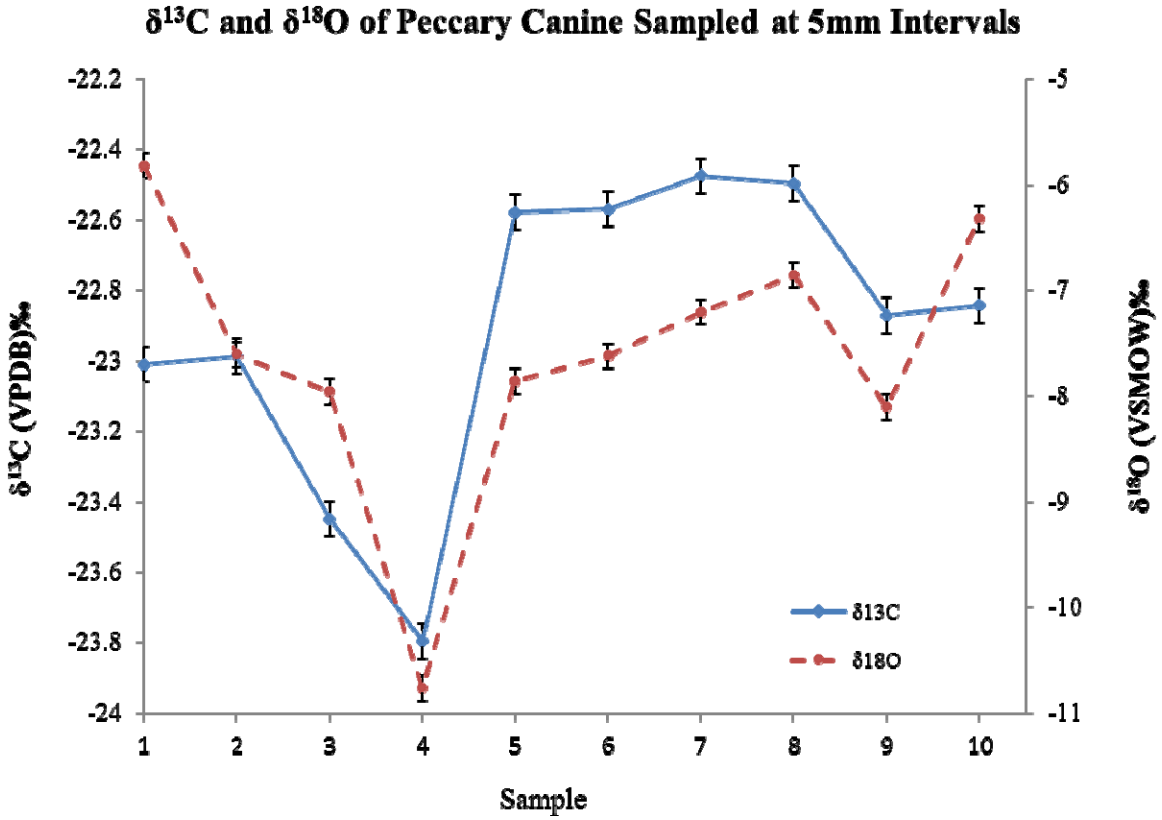
Sampled Specimen and Data

Table 1. $\delta^{13}C$ and $\delta^{18}O$ from the Peccary Tusk

Sample	Distance from Tip (mm)	$\delta^{13}C$ (water + food signal)	$\delta^{13}C$ - 13.3 ± 0.3‰	$\delta^{18}O$ (water signal)
1	5	-9.71039 ± .05‰	-23.01039 ± .35‰	-5.81992 ± .12‰
2	10	-9.68591 ± .05‰	-22.98591 ± .35‰	-7.60931 ± .12‰
3	15	-10.14924 ± .05‰	-23.44924 ± .35‰	-7.95595 ± .12‰
4	20	-10.49568 ± .05‰	-23.79568 ± .35‰	-10.76624 ± .12‰
5	25	-9.27723 ± .05‰	-22.57723 ± .35‰	-7.85954 ± .12‰
6	30	-9.26932 ± .05‰	-22.56932 ± .35‰	-7.62026 ± .12‰
7	35	-9.17465 ± .05‰	-22.47465 ± .35‰	-7.20390 ± .12‰
8	40	-9.19607 ± .05‰	-22.49607 ± .35‰	-6.85163 ± .12‰
9	45	-9.57073 ± .05‰	-22.87073 ± .35‰	-8.10321 ± .12‰
10	50	-9.54281 ± .05‰	-22.84281 ± .35‰	-6.32345 ± .12‰

$\delta^{13}C$ -13.3‰ is the expected $\delta^{13}C$ value of the forage that produced the $\delta^{13}C$ signature of the tusk based on experimental data showing *Suidae* (pig-family) "$\varepsilon^{*}_{enamel\text{-}diet}$ for pigs is 13.3 ± 0.3‰" (Passey et al 2005:1466).

$\delta^{13}C$ and $\delta^{18}O$ of the Samples



- $\delta^{13}C$ values remain fairly consistent around -23‰
- $\delta^{13}C$ variation likely reflective of water source Carbon variation
- $\delta^{18}O$ from samples 3 – 5 show a seasonal signal likely capturing a winter

Conclusions

- Combined $\delta^{13}C$ of food and water reveals a likely C_3 plant dietary focus, confirming prior diet assumptions based on morphological characteristics
- Changing weather patterns at the end of the Pleistocene favored C_4 plants over C_3. Adaptation to C_3 may have been too difficult for peccaries to overcome
- Seasonal $\delta^{18}O$ variations are captured in the tusk – it may be possible to use this, with more samples, to look for behavioral patterns or assist in environmental reconstruction

Citations

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